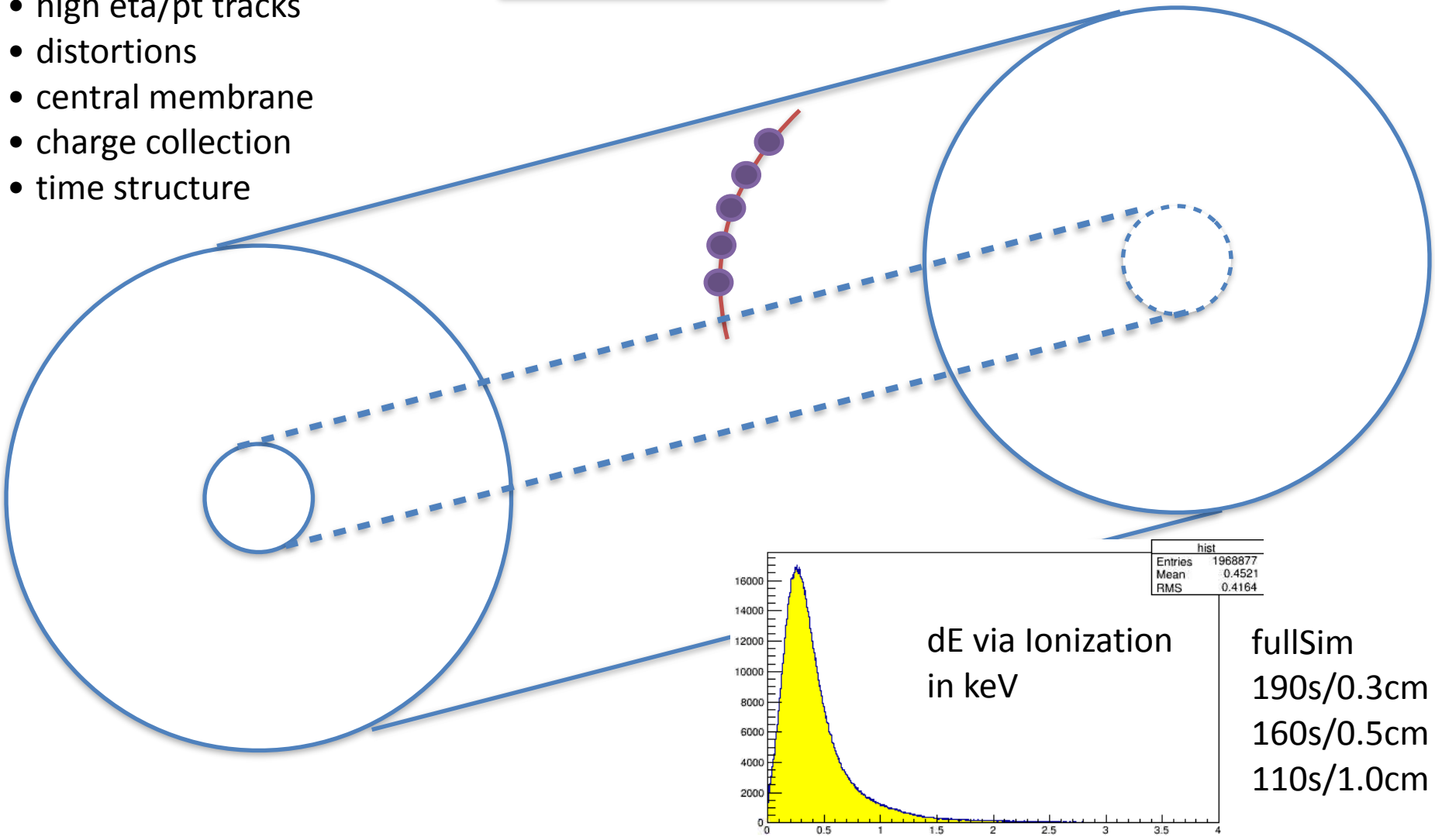
One big active volume

Better description of
- high eta/pt tracks
- distortions
- central membrane
- charge collection
- time structure

StepLength is controlled

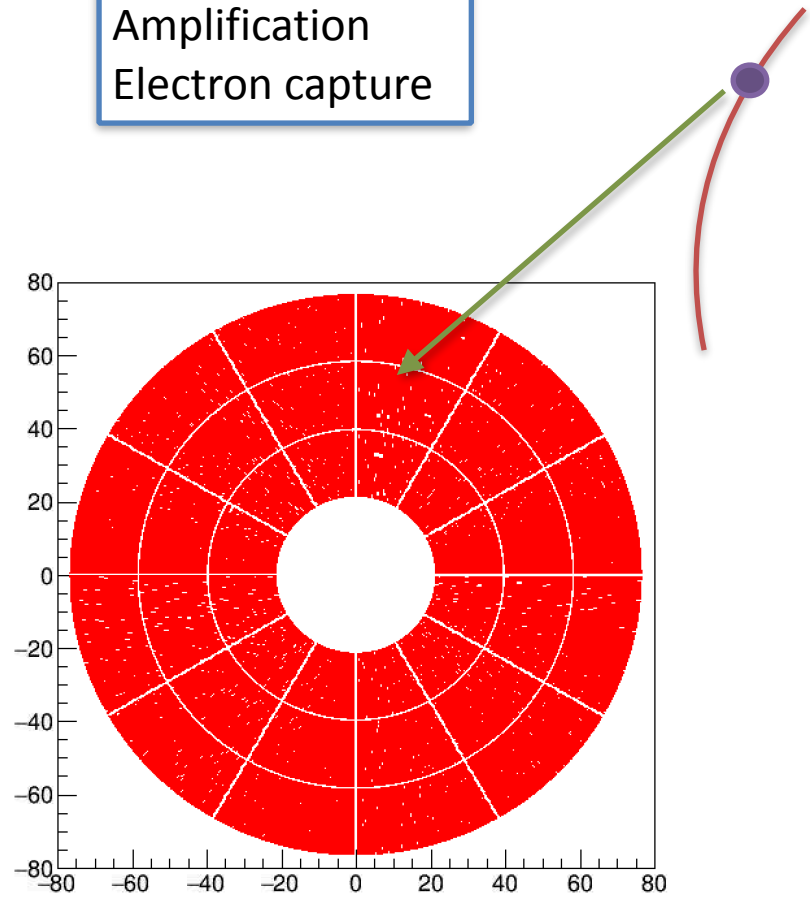


dE via Ionization
in keV

fullSim
190s/0.3cm
160s/0.5cm
110s/1.0cm

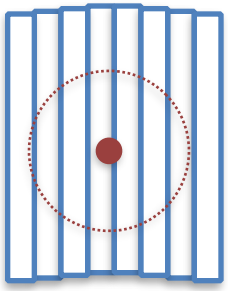
TPC Simulation starts after G4 hit

Transport
Distortions
Amplification
Electron capture




```
List of Nodes in Fun4AllServer:
Node Tree under TopNode TOP
TOP (PHCompositeNode)/
   DST (PHCompositeNode)/
      PHG4INEVENT (PHDataNode)
      PHHepMCGenEvent (IO,PHHepMCGenEvent)
      PIPE (PHCompositeNode)/
         G4HIT_PIPE (IO,PHG4HitContainer)
      SVTX (PHCompositeNode)/
         G4HIT_SVTX (IO,PHG4HitContainer)
         SvtxHitMap (IO,SvtxHitMap_v1)
         SvtxClusterMap (IO,SvtxClusterMap_v1)
         SvtxTrackMap (IO,SvtxTrackMap_v1)
         SvtxVertexMap (IO,SvtxVertexMap_v1)
      TPCHits (IO,PHObject)
      MAGNET (PHCompositeNode)/
         G4HIT_MAGNET (IO,PHG4HitContainer)
      G4HIT_BH_1 (IO,PHG4HitContainer)
      BH_FORWARD_PLUS (PHCompositeNode)/
         G4HIT_BH_FORWARD_PLUS (IO,PHG4HitContainer)
      BH_FORWARD_NEG (PHCompositeNode)/
         G4HIT_BH_FORWARD_NEG (IO,PHG4HitContainer)
      G4TruthInfo (IO,PHG4TruthInfoContainer)
      BBC (PHCompositeNode)/
         BbcVertexMap (IO,BbcVertexMap_v1)
      G4CELL_SVTX (IO,PHG4CellContainer)
      TPCDigits (IO,PHObject)
      GLOBAL (PHCompositeNode)/
         GlobalVertexMap (IO,GlobalVertexMap_v1)
```

Pad Matching



sketch of pads in traverse plane and cloud from microsimulation

Cloud is projected into RO geometry. Algorithm computes range of pads compatible with cloud centroid and spread and return range of pairs (PAD;QUOTA)

Quotas are computed using PDF in cylindrical coords. CDF is obtained by integrating in radius to cover layer and simplifying based on small angle approximation.

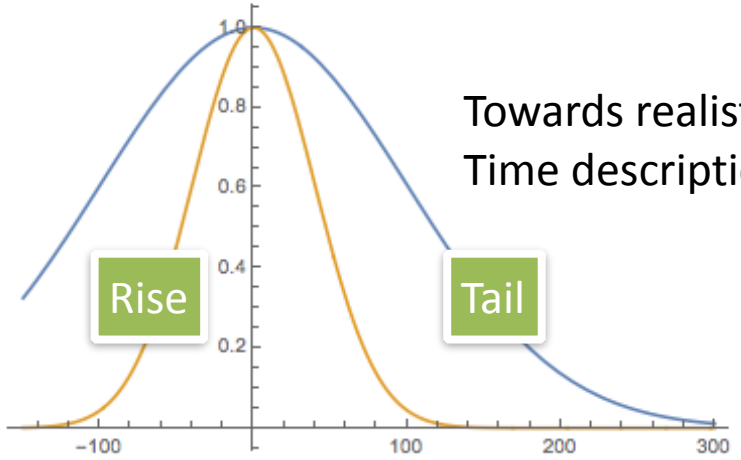
Example of two hits left by track from Central Hijing ev.

```
PushCloud2Module 56
CLOUD WEIGHT 30000 to be stored in 8 pads.
  PAD 1129(8) weight 92.076 to be stored in 4 time bins.
  PAD 1130(8) weight 1332.66 to be stored in 5 time bins.
  PAD 1131(8) weight 1084.78 to be stored in 5 time bins.
  PAD 1132(8) weight 48.7581 to be stored in 4 time bins.
  PAD 1257(9) weight 932.654 to be stored in 5 time bins.
  PAD 1258(9) weight 12120.9 to be stored in 7 time bins.
  PAD 1259(9) weight 8855.97 to be stored in 6 time bins.
  PAD 1260(9) weight 353.867 to be stored in 5 time bins.
  ==> SUM PAD WIGHTS 24821
PushCloud2Module 56
CLOUD WEIGHT 16000 to be stored in 6 pads.
  PAD 1130(8) weight 47.9372 to be stored in 3 time bins.
  PAD 1131(8) weight 20.6066 to be stored in 3 time bins.
  PAD 1257(9) weight 1238.98 to be stored in 6 time bins.
  PAD 1258(9) weight 8547.83 to be stored in 6 time bins.
  PAD 1259(9) weight 3292.65 to be stored in 6 time bins.
  PAD 1260(9) weight 65.2591 to be stored in 5 time bins.
  ==> SUM PAD WIGHTS 13213
PushCloud2Module 56
```

Pulse shape

In[25]:= `Plot[{Exp[-(x)*(x)/100/100/2], Exp[-x*x/40/40/2]}, {x, -150, 300}]`

Out[25]=



Towards realistic
Time description

I used two gaussians to describe the shaping of the Sampa chip

Prepulse -> sigma 40ns
Postpulse -> sigma 100ns

Example of sampling at 10 MSPS

```
PAD 14(0) weight 2553.71 to be stored in 6 time bins.
  TIME 43 weight 14
  TIME 44 weight 1225
  TIME 45 weight 899
  TIME 46 weight 354
  TIME 47 weight 56
  TIME 48 weight 3
  ==> SUM TIME WIGHTS 2551
PAD 15(0) weight 2002.86 to be stored in 6 time bins.
  TIME 43 weight 11
  TIME 44 weight 961
  TIME 45 weight 705
  TIME 46 weight 277
  TIME 47 weight 44
  TIME 48 weight 2
  ==> SUM TIME WIGHTS 2000
```

Example of sampling at 20 MSPS

```
PAD 2947(15) weight 1227.04 to be stored in 10 time bins.
  TIME 313 weight 6
  TIME 314 weight 108
  TIME 315 weight 464
  TIME 316 weight 257
  TIME 317 weight 187
  TIME 318 weight 116
  TIME 319 weight 56
  TIME 320 weight 21
  TIME 321 weight 6
  TIME 322 weight 1
  ==> SUM TIME WIGHTS 1222
```